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ORIGINAL ARTICLES.

A CASE OF QUADRISECTORAL HOMONYMOUS HEMIANOPSIA.

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"Professor" B., a well-known dancing master of this city, consulted me for some eye trouble about a year ago. He was at that time suffering from paralytic symptoms due to a long period of sickness from which he had not yet recovered. Though his eyes had bothered him before, they were not nearly as bad as at the time of consultation. In July, 1893, he began to suffer from very severe and continual headaches, and one day, while standing in a drugstore, he suddenly lost consciousness and fell to the floor. He was carried to his home, and continued to be unconscious for nearly twelve hours, but on recovering found himself paralyzed on the right side, the upper extremity being affected the most severely. The case was then considered, and treated, as an attack of apoplexy. The measures employed seemed successful for the patient was

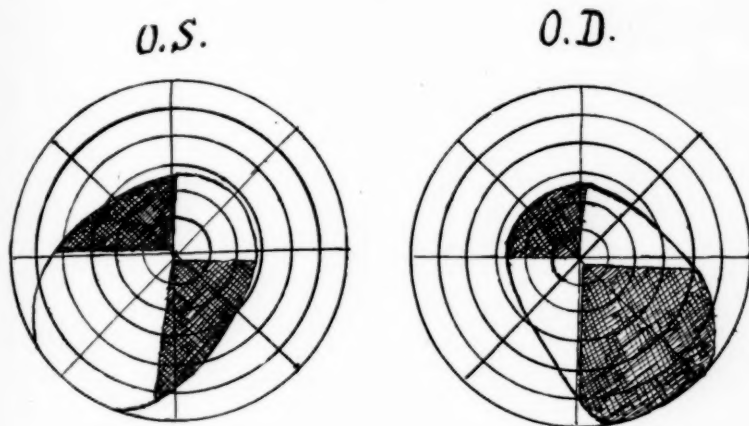
able to resume the instruction of dancing classes in September. He noticed, however, that his eyes were worse and that his cephalalgia continued unabated. About November his health began to fail again. Vomiting would often accompany his headaches and his memory began to show signs of unreliability, while his temper became exceedingly irritable. He had to take to bed, for his mental action seemed at times entirely suspended, while sometimes he would become so violent that he had to be restrained by force. Several physicians were at the time in attendance, but their measures seemed without effect, for the patient became worse continually. Even his reflex system began to suffer, as fæces and urine were passed involuntarily and unconsciously. His speech, too, became thick and unintelligible, as articulation seemed almost impossible. The impression and appearance of idiocy were still further increased by a paralysis of the oculo-motors on both sides, which, however, disappeared a few days later.

Although the patient's history was well known to the attending physicians, several adhered to the theory of apoplexy. Others suspected cerebral syphilis and treated it as such, while several more held different opinions. The disagreeing diagnoses together with the uniform lack of improvement caused many changes in the employment of medical attendants. Besides, the patient was such a well-known character about town that his disease became a frequent subject of discussion, even among the laity.

Dr. Riley, of this city, was the first to bring about an improvement and it was he who first urged an examination of the eyes. The patient told me at once of his syphilitic infection and his former dissipation, as a result of which there could be seen a Hunterian scar on the dorsum of the tongue, which showed especially plainly on rubefaction. Ophthalmoscopic examination revealed a normal fundus with perfect transparency of the media. At the papilla considerable blanching could be seen, still it was not the appearance of plain and unmistakable atrophy. His muscles balanced well, but his acuity of vision had suffered some (O. S. V.= $\frac{20}{XL}$; O. D. V.= $\frac{20}{XL}$). The test-

ing was accompanied by continual turning of the patient's head, a fact explained by his records of vision.

The fields given below show very little *general* contraction, but two large scotomata in both eyes. All of these defects were absolute. Owing to their homonymous disposition, objects under fixation would lack two corresponding quarters, a fact which did not allow reading without continual turning of the head and eyes.



FIELDS OF VISION.

WHITE=Area of Sight.

BLACK=Sectors Blotted Out.

The hemianopsia coming as a result of an apoplectoid seizure, the violent headache, the occurrence of paralytic symptoms, both of the skeletal muscles and those of the eyeball together with the blanching (atrophy ?) of the papilla caused me to make the diagnosis of tumor cerebri, while the patient's history caused me to assume a syphilitic pathogenesis.

Dr. Riley's treatment had already greatly improved his condition, but he was a little afraid to still further increase the dosage on account of the fault-finding talk of some officious druggist; even a meddling physician hand ventured the prediction that such medication would corrode the patient's stomach.

It was for that reason that Dr. Riley feared trouble in case of some accidental complication. The patient had, up to that time, gone a little over two drachms for a single dose, administered three to four times a day. I urged an increase, however, recommending to raise the daily quantity to two ounces (3ij) and to divide said amount into five or six doses, thoroughly diluted in water. In case of trouble I promised my full support and sanction of the treatment in question. These heroic quantities brought on rapid improvement, enabling the patient to resume his business some four months later. His eye sight, however, is still incomplete, the scotoma remaining unchanged, although he thinks his vision is clearer.

With references to "massive" medication I would say that I first saw it carried out by the well-known neurologist, Prof. Walker, of Indianapolis, and I must confess that I have seen some wonderful results from it. Whenever ordinary specific measures refuse to cure a case of syphilis in spite of all the care and attention given to the system in the way of building it up and avoiding hurtful influences, massive medication should be given a trial, but *only after the ordinary methods have proved unsuccessful*. So far as the tolerance of the system for iodides is concerned, it is wonderful how much of it can be given without complaints on the part of the patient.

Owing to the history of our case most of the attending physicians had ordered specific medication, but without avail. Dr. Riley first began with high doses with the results described.

ANALYSIS OF LOCALIZATION.

Injury to one of the optic nerves anterior to the chiasm would cause monocular blindness. Trouble in the chiasm may cause hemianopsia, but not the homonymous variety.

(We must consider our case as an instance of incomplete homonymous hemianopsia, both right and left.

Homonymous hemianopsia may have its origin in:

1. Optic bands.
2. Optic thalamus (incl. ant. corp. quadrig.)
3. Occipital lobe. *a.* Gray matter. *b.* White matter.

The first two possibilities are here excluded. The sectoral nature of the defects would require compression of a well-defined, sharp-cut quarter of a band, a thing hardly possible with a large diffuse infiltration; besides, this same identical nicety would have to occur on the other side. With reference to the optic thalamus we would quote Nothnagel's statement that trouble in the latter location is not accompanied by paralytic symptoms. DeWecker's statement leaves the occipital lobes as the place of morbid action; he says:

"L'existence de scotomes symétriques parle en faveur d' un processus pathologique siégeant (dans) les hémisphères. * * * L'hémianopie peut être complète, et le scotome absolu. Dans ce cas il s'agira de destruction plus large comprenant les éléments *optiques* d' un hémisphère."

The co-existence of motor and sensory disturbances shows that also the back part of the internal capsule was implicated. The double homonymous scotomata (incomplete hemianopsia) imply damage to both occipital lobes.

REPORT OF A CASE OF NEURO-PARALYTIC KERATITIS FROM INJURY TO THE TEMPORAL BONE.

BY L. R. CULBERTSON, M.D., ZANESVILLE, OHIO.

Miss E. O. C., six years ago was run over by a farm wagon one wheel of which passed over the mastoid portion of the left temporal bone crushing the mastoid completely and injuring facial nerve in the Aquæductus Fallopii at the point where it gives off the chorda tympani nerve, causing paralysis of left side of the face and constant dryness of the left half of the tongue (she is constantly trying to moisten this half of tongue). She protrudes the tongue to the right. Says her left eye is numb. Hearing normal. No difficulty in deglutition.

Ophthalmoscopic examination: R. E. media normal; disc shows slight atrophic cupping; arteries too fine, veins enlarged, capillaries wanting on disc. Disc pale (grey atrophy). Iris normal as well as choroid. L. E. dense opacity (leucoma) of entire cornea result of neuro-paralytic keratitis. No evidence of corneal ulcer visible now. She says "that when she was run over the entire left side of face became black and blue; that eye became inflamed and swollen; that she was deaf in left ear for some time." Her reason is somewhat impaired. No history or evidences of syphilis. Knee-jerks normal. No anæsthesia or hyperæsthesia other than mentioned. V. R. E. Rem. with + 1 s. \bigcirc — 1.5 c. at 180= $\frac{1}{IV}$.

REMARKS.

As deglutition and hearing are normal I conclude that the injury to the facial nerve was at a point below where it gives off the motor fibres to supply the otic and Meckel's and the spheno-palatine ganglia. The neuro-paralytic keratitis could be accounted for in several ways:

First, If the branches of the great sympathetic were impaired as it passed through the petrous portion of the temporal bone to supply the ophthalmic ganglion, it would by causing dilatation of vessels of the cornea, iris, choroid, etc., cause inflammation of cornea and perhaps destruction of entire globe.¹

Second, The nasal branch of the fifth nerve before entering the orbit, gives off a long filament to the ophthalmic ganglion, and then the long ciliary nerves supplying the ciliary muscle, iris and cornea.² The filament of the nasal going to the ophthalmic may have been injured; or the nasal branch itself may have been injured.

Third, The sympathetic branch supplying the ophthalmic ganglion; or the branch of the fifth may have been affected by the meningeal inflammation. W. E. Kant³ reported a case of a boy who received a wound of the squamous portion of the left temporal bone an inch above the insertion of the auricle. Probe passed to depth of an inch. Left cornea opaque and of a milky white color; there was much general congestion of the eye. Cornea remained hazy. Four months later the function of both the muscular and sensory nerves had been regained, but to only a limited degree. Mr. Cant thought the injury had been one of direct injury to the whole fifth nerve within the skull, between the brain and the Gasserian ganglion, or at the latter.

In my case the great weight which crushed the mastoid portion was sufficient to have split the petrous portion at its apex. Or could the wedge—the petrous portion—so beautifully formed by Nature to resist shock and injury to the base of the brain, have been loosed and forced slightly inward? It does not seem possible.

The surgeon who attended her at the time is dead and I regret that I cannot get his record of her case.

¹Chapman's Physiology.

²Chapman's Physiology.

³Proceedings of the Ophthalmological Society of the United Kingdom, 1889, in British Medical Journal.

SOCIETY PROCEEDINGS.

EIGHTH INTERNATIONAL OPHTHALMOLOGICAL CONGRESS.

EDINBURGH, AUGUST 7-10, 1894.

[CONCLUDED.]

THIRD DAY.

DEMONSTRATIONS.

DR. LEBER, of Heidelberg, demonstrated the value of a new method of hardening eye preparations in formol. Formol hardens by coagulation and has no attraction for water. Eyes may be examined twenty-four hours after immersion. No washing out of fluid is necessary, and the color of the tissues and transparency of the media are preserved.

DR. BACH, Würzburg, demonstrated the more minute structure of the ciliary ganglion.

DR. OSTWALT, of Paris, gave a demonstration of ophthalmometry.

DR. GUTMANN, of Berlin.—The Nature of Schlemm's Canal.

DR. CLARK, of Columbus, Ohio.—A Serous Cyst of the Iris.

STRABOTOMY.

DR. LANDOLT, of Paris, read a paper on this subject. His experience in the surgical treatment of squint may be summed up thus: The superiority of advancement over setting back of the muscle. There is more than one good method; the essential point consists in bringing the muscle and surrounding

structures as near to the cornea as possible and fixing them there. The result to be attained is not simply apparent parallelism in the primary position, but both eyes should be fixed on the same point throughout the entire field of movement; this is not shown by a photograph.

Tenotomy always produces limitation of movement; advancement does not. Advancement causes no disfigurement. It is precisely in insufficiencies and feeble degrees of squint that advancement is most indicated, unlike the general opinion which regards advancement only as an adjuvant to tenotomy in very high degrees.

The operation should only be performed after all other means have failed; if the squint persists, there is always time for tenotomy.

DISCUSSION.

DR. SWANZY, said: Squint operations are like the question of cataract operations—one operator prefers one method, another, a different one. Dr. Graefe's rules in the matter still hold good. He has never done advancement alone, but only in combination with tenotomy. He does not believe that tenotomy should be rejected to the extent Dr. Landolt advocates. Advancement sometimes causes disfigurement in a small lump near the cornea, due to buckling of the tendon. It is good practice to combine resection of the tendon with advancement, but it is difficult to determine how much, and if you overdo, there is no help.

DR. PANAS agreed fully with Dr. Landolt.

DR. ROOSA had practiced advancement in extreme cases, but would not substitute it for tenotomy, as a rule. Advancement is a more serious operation. Does not think diplopia will result from tenotomy, if the refraction has been carefully attended to, especially, if the astigmatism is corrected. Advancement is an adjuvant to tenotomy, but cannot replace it.

DR. NOYES.—There is more in this matter than the operation; cerebral and amblyopic conditions have a place, and these

modify the method to be employed. Stevens' instruments permit of a small wound and thus the sinking of the caruncle may be avoided. Advancement is an adjuvant, but not the prime method. We always should endeavor to restore binocular vision. To succeed in this, the patient must be intelligent, and therefore the operation should not be done in children.

DR. GRUENING said his work had been in a direction opposed to that of Dr. Landolt. He has tried to substitute tenotomy where advancement is recommended.

DR. STEVENS, of New York, said, as Dr. Landolt has insisted, the object to be attained is the production of binocular vision throughout the entire field. This demands a study of all the tensions which bring this about, hence Dr. Landolt is inconsistent in advancing the muscle of one eye and leaving the corresponding muscle of the other eye untouched. Dr. Stevens has, for many years, insisted on this point. He has not been as successful as Dr. Landolt in his advancements. He believes that advancement restricts rotation more than does tenotomy.

DR. LANDOLT, in reply, said: If it is a question of operation, we must operate upon the muscles and not upon the motor centres. Operation is not the cure—only one step in a long course of treatment. Refraction is to be attended to, with orthoptic treatment, etc. With all his admiration for Dr. Graefe, he believes that Dr. Graefe's views on strabismus were erroneous. He hoped that at the next meeting, more of the colleagues will agree, not so much with what he has said, but with what he has implied.

BEST WAY OF USING MERCURY IN OCULAR THERAPEUTICS.

DR. DARIER, of Paris, thought inunction the most certain and rapid method. Alimentary administration has many disadvantages, as interference with digestion. The amount which can traverse the liver depends upon the condition of the passages, and varies greatly. The hypodermic method is the most exact. He has employed for this purpose chiefly the pepto-

nate and bichloride and the cyanide, to which he gives the preference. Injections may be given daily or less often; he injects 5 milligrams largely diluted, and obtains as powerful effects as by inunction.

Many affections can be treated locally by subconjunctival and even intra-ocular injection, without producing systemic effects. Such treatment is not empirical but philosophic. The eye is well adapted for such local treatment. Local therapeutics are indicated where rapid action is necessary, as in sympathetic ophthalmia, where intra-ocular injection offers the best chance; so, too, in secondary septic infection, after operation. Septic corneal ulcers are best treated by subconjunctival injection.

In some diseases of the deep seated structures, as choroiditis and retinitis, subconjunctival injections have given astonishing results.

So, too, in infection of the iris after traumatism. But he cannot say the same of endogenic infection. The method is very useful in hypopyon keratitis, interstitial keratitis, plastic iritis, in combination with general hypodermic injection.

DISCUSSION.

DR. DEUTSCHMANN, speaking of subconjunctival injection, said: Long observation is necessary to arrive at correct conclusions as to the value of this method. He is well satisfied of its usefulness in certain cases. It is necessary to distinguish between syphilitic and non-syphilitic disease. It is most valuable in specific forms. In infective keratitis, the cautery is superior; in interstitial keratitis a cure may be obtained in six to eight weeks, which would otherwise require four to six months. It is especially valuable in iritis, particularly specific iritis. He has treated very severe cases of this disease with numerous posterior synechiæ, and found that the eye has become free from all irritation in eight days; and that without the use of atropine, the iris had become free from adhesion to the capsule. Choroiditis, retinitis and affections of the optic nerve,

have yielded less satisfactory results; in specific choroiditis, the results have been better.

In sepsis, after operation, subconjunctival injection is the very best treatment. He should not be deterred by the occurrence of the great chemosis which follows. Experiments on animals by injection of large quantities of germs are not parallel with the process in man where the germs are few in the beginning of the morbid process.

DR. HESS, of Leipzig, made experiments in animals and found the injections absolutely useless, even if these were begun before the eye had been infected.

DR. DUFOUR, of Lausaune, reported a case of infection for a foreign body in which the focus could be seen to diminish daily under the injections. It makes no difference whether the chemist can find mercury in the eye or not. In atypical interstitial keratitis he had obtained excellent results.

DR. GUTMANN has tried injection in fifty cases, and did not have a single favorable result; in one case of iridio-choroiditis the conditions were much aggravated.

DR. BACH has had no favorable results. In eighty rabbit eyes in which he practiced subconjunctival injection, the chemical examination failed to find a trace of mercury.

DR. CHIBRET sometimes gets good effects, and sometimes none.

DR. DARIER.—If Bach has failed to find mercury in the eye, it has been found by other chemists. He himself has no rabbit patients (!) and it seems strange that the drug should be useful in man and not in rabbits. In interstitial keratitis the best results are obtained in the torpid cases and not in those with great congestion.

REMARKS ON THE OPERATIVE CORRECTION OF MYOPIA.

DR. THIER, of Aix-la-Chapelle.—Mooren, as early as 1855, advocated this treatment. Donders opposed it on account of the loss of accommodation. Mauthner would have been an

advocate of it, he stated, if an operation could be devised as free from danger as is iridectomy.

It is still too early to say what the effect will be on the accompanying choroiditis posterior.

DR. FUKALA, of Pilsen, reintroduced it. He has operated 38 times—11 times on both eyes.

There was improvement in all but three cases in the acuteness of vision. Experience shows that even near work is better performed by an aphakic eye than by a highly myopic one. Cases of 13 D. and over are suitable. If one eye only be operated, with the idea that the patient will use the unoperated eye for near work, this will be found not to be the case. He prefers the work with the aphakic eye at all distances.

DR. FUKALA would exclude high degrees of choroiditis. There is some danger of detachment of the retina, but this accident occurs in high degrees of myopia without operation.

DR. MEIGHAN, of Glasgow, has operated three times. Two were satisfactory, one was followed by detachment of the retina three months after operation. The operation involves considerable risk, as do all operations in high myopia. More extended experience is necessary before definite conclusions can be formulated.

DR. SCHMIDT-RIMPLER, of Göttingen, had the opportunity of examining an eye in which discission had been done forty years before for congenital cataract in one eye. Both eyes were myopic, so that the operation had not arrested the development of the myopia, perhaps because one eye having not been operated upon, the evil effects of convergence persisted.

DR. PFLUEGER had operated in 40 or 50 cases. He agrees with Dr. Fukala; all his results were good. Choroiditis is not a contra-indication in myopia of 15 D. and upward. Choroiditis is almost always present, and he has found no inconvenience from this. He has not yet observed a case of detachment of the retina. This is, of course, possible in high myopia, even where no operation is done. He has operated up to the age of 48.

DR. FERGUS, of Glasgow, has operated on nine eyes. Does

not operate for less than—18. D. He once operated on a myopia of—15, leaving the patient hyperopic and not emmetropic. He would rather not operate in patients over 24 years of age. He usually draws off the macerated lens.

A person with M.=15. D. has no use for his accommodation. He would not operate when the myopia is progressive, but wait until it became stationary.

EXCISION OF IRIS AND INFILTRATED TISSUE.

DR. NOYES, of New York.—Iridotomy is useless in these cases; so is iridectomy even by Wecker's scissors. What remains? He makes a double incision with a Graefe knife. As the knife is withdrawn it is at once plunged through the tissue. A weak solution of common salt is injected through one opening which is forced out through the other. Then he introduces de Wecker's scissors and makes two incisions meeting at an angle, and again injects the solution to clear the eye of blood and restore its tone. Finally he introduces a hook to withdraw the flap formed by these incisions out of the eye; this is then cut off. He again irrigates and bandages.

DR. DARIER said that Abadie had described a very similar operation four years ago.

NEW SYSTEM OF DESIGNATING PRISMS.

DR. BURNETT, of Washington, read a paper on the "New Metric or Dioptral System of Measuring and Designating Prisms." Instead of numbering by the angle of the prism, it is proposed to measure the actual deviation on a plane at a meter's distance. A prism which causes a deflection of 1 cm. at that distance is No. 1, and its refractive power is called a prism-dioptre. A deflection of 2 cm.=2 P. D., etc.; the sign Δ is used instead of $^{\circ}$.

FOURTH DAY. DEMONSTRATIONS.

DR. BORTHEM, of Drontheim, demonstrated drawings of leprous diseases of the eye with remarks.

DR. BRONNER, of Bradford.—“Specimens and Photographs of Lymphoma Cured by Arsenic.”

DR. RISLEY, of Philadelphia.—“Apparatus for the Support of Trial Glasses and a Variable Prism.”

DR. AYRES, of Cincinnati.—“Granulation and Chalazion Forceps.”

ARTIFICIAL RIPENING OF CATARACT.

DR. VCHARDY, of London, read a paper on the artificial ripening of immature cataract by preliminary iridectomy, with trituration through the cornea. This subject has occupied his attention for nine years. Complete ripening of immature senile cataracts may be safely attained in from eight days to eight weeks.

Subsequent extraction is as safe as when maturation is left to nature and free from the evil results of removal of immature cataracts. He prefers to wait six or eight weeks after trituration before extracting. The eye should be well under atropine at the time of trituration.

DISCUSSION.

DR. NOYES believes there is a field for trituration; iridectomy is not necessary. Young subjects with no sclerosis of the nucleus are the most suitable. Cataracts with sclerosed nuclei can be readily extracted, without maturation. He has operated in cases where patients were still able to go about, but not to read, and where the disc and vessels could be seen.

DR. GRIFFITHS, of Manchester, only adopts the procedure in cases where a distinct object is to be gained. He prefers to have the cataract mature naturally, and only triturates where this process is extremely slow, as in a case in which he employed it five years ago with success in one eye, and the other is still in the same condition as five years ago.

Extraction is the same as when the lens matures of itself. He believes operations on immature cataracts to be dangerous.

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SYMPATHETIC OPHTHALMIA AFTER SARCOMA OF THE CHOROID.

DR. NIEDEN, of Bochum, found but three cases of this kind in literature (where no perforation took place). His case was that of a young lady aged 21. When first seen, there was a detachment of the retina in the right eye. This had existed for months. The left eye was healthy. Diagnosis: Detachment of retina, only slight suspicion of a tumor. Some months later, the patient returned with severe plastis iritis of O.D.V. $=\frac{2}{LX}$; O.S. healthy. The iritis was rapidly cured by the usual treatment. Tension normal. A few months later the patient again returned with deep inflammation of both eyes. Iridocyclitis, descemetitis, opacities of vitreous. O.D. worse than O.S.—V.O.D. fingers at a meter. O.S.V $=\frac{6}{L}$. O.D. tension +1. Diagnosis of tumor of O. D. and sympathetic ophthalmia of O. S.—O. D. enucleated and O.S. treated in the usual way; final result, V almost normal. Microscopic examination by Deutschmann showed the growth to be a spindle celled sarcoma of the choroid of the right eye.

Deutschmann found micro-organism in O. D., to which the inflammation of the other eye is to be ascribed by endogenous infection.

LARGE LACHRYMAL PROBES.

DR. THEOBALD, of Baltimore, read a paper on the "Radical Cure of Stricture of the Lachrymal Duct." He has advocated larger probes for seventeen years. His treatment is based on a study of the anatomy of the parts. It is useless to expect to cure with a probe of $1\frac{1}{2}$ mm. in diameter, in a canal the diameter of which equals 4.25 mm. There is less risk of a false passage with large than with small probes. His experience of seventeen years show that the cure is permanent.

DISCUSSION.

DR. GRUENING has had experience with Theobald probes, corroborates all he has said. He observed a smile of incred-

ulity in some when No. 16 was mentioned, but that number can be passed without injury. He has seen the lachrymal gland extirpated—a procedure entirely unnecessary if the case is treated by large probes.

DR. ROOSA does not admit that his results, without large probes, are bad. Bowman's probes, slightly enlarged for special cases, answer every requirement. Many cases are simply catarrhal without stricture.

DR. SWANZY would ask about the curvature Theobald gives to the probes; those shown are hardly suited to the direction of the duct.

DR. THOMPSON thinks many cases are not cureable by any method. Solon's advise to Cræsus to count no one happy until he is dead, applies to this affection, *i. e.*, till patient or surgeon is dead.

DR. RISLEY objects to the statement that conservative treatment yields no results. Large probes destroy the physiological function of the duct, which is that of a capillary tube and not a drain pipe.

DR. PRIESTLY SMITH treats these cases by inserting a style after probing. Patients wear the style for three months with no inconvenience. Some treatment is given the the lower end of the duct in the nose.

DR. LEE, of Liverpool, uses hollow probes with several apertures at the side and injects some antiseptic solution.

The President stated that Cooper, of London, had introduced large probes eighteen years ago; to him belongs the credit, whatever it may be.

DR. STOLTING, of Hanover, read a paper on the cure of hydrophthalmus.

It was decided to hold the next Congress in Utrecht, Holland.—*Philadelphia Polyclinic.*

SELECTIONS.

THE PREVENTION OF BLINDNESS—OF OPHTHALMIA NEONATORUM AND OF DEFECTIVE EYESIGHT, BY SANITARY LEGISLATION.¹

BY BENJAMIN LEE, A.M., M.D., PH.D., PHILADELPHIA, PA.

Secretary of the State Board of Health of Pennsylvania.

In considering the individual with reference to his value to his community and to the State, it will readily be admitted that there are many kinds and degrees of imperfect or perverted vision, which, while they do not make the victim an actual burden upon the State or upon his kinsfolk, do seriously impair his usefulness, and make him a less productive member of the social hive than he would be with perfect lenses, normal accommodation, and humors of unimpaired translucency. Not simply the fact that he will perform with greater difficulty all operations requiring keen sightedness, but the additional fact of the long train of nervous disorders which are induced by the exhausting efforts of the imperfect eye to meet the requirements of even the every-day duties of life—to say nothing of those of skilled workmanship—must be taken into account in measuring the disability thus caused. The day has gone by when the myope could boast of the strength of his eyes. The dictum is now well established that the near-sighted eye is an imperfect eye, and almost invariably, often at some critical

¹Read before the American Academy of Medicine at its Nineteenth Annual Meeting, at Jefferson, N. H., August 28, 1894.

period, when its owner can least afford to dispense with its services, it sooner or later develops its unreliability.

I do not forget the wonderful advances made in ophthalmology in the discovery of errors of refraction and accommodation and of the mechanical means for their correction. In fact, as I look back to the condition of that science when I began my medical studies, and its then helplessness in view of such disorders, and reflect how many sufferers are now restored to comfort and usefulness who would at that time have been stranded on the shores of a useless and often agonizing invalidism, I am filled at once with regret and with gratitude—with regret that such an incalculable amount of relievable suffering went so long unrelieved; with gratitude that such amazing relief can now be afforded and by means so apparently simple. This seems to me indeed one of the most brilliant achievements of modern medical science. But, even in this work of relief, energies are expended and inventive genius exhausted in fields which are simply reparative and not productive. So that, even from this optimistic standpoint, there is still a loss to the State.

It would be ludicrous, were it not mournful, to note how ready we are, in our organized capacity, to provide relief for "defectives," and yet how slow to adopt measures to prevent their existence. Our law-givers disclose a mental myopia of a high grade in their observation of social conditions. The State will not do its full duty until the health officers and the sanitary authorities take an active supervision of the individual from the first moment of his existence to the time when—having lived out his hundred years, in the full possession of all his faculties, the use of which he has enjoyed to the full, while at the same time he has added to the wealth of the country and the happiness of his fellows—his body, simply yielding to the inexorable touch of time, shall relinquish its relaxing grasp upon this happy spirit and set it free for higher flights.

Beginning, then, with the new-born child, is there any *cause of blindness which could be removed by the interposition of the law?*

In the State of Pennsylvania, we are confronted by the startling fact that, while the increase of population during the decade ending with the year 1880 was 21.6%, the apparent increase in blindness was 119.18%, showing that this disability had increased more than five times more rapidly than the population. Allowing its full value to the probable greater fullness and accuracy of reporting during the later decade, there is still in this result food for the most serious reflection. The inquiry naturally suggests itself whether a possible cause can be assigned for this lamentable disproportion.

One factor is certainly deserving of consideration, and that is the fact that a large proportion of the increase of population was due to immigration. Owing to the extensive mining, iron-working and railroading interests of the State, the great mass of these immigrants were either Slavs or Italians. Now, as is well known, among these peoples a physician is rarely called upon to preside over the act of parturition. The entire care of the new-born child is left to the midwife, nurse or neighbor. Couple this with the now well recognized fact that the most important factor in the production of blindness is *ophthalmia neonatorum*; and here may we have a partial clue to the distressingly rapid increase of this class of defectives? With reference to this last statement, the evidence is overwhelming. Fuchs found that among 3,204 cases of blindness collected from asylums in different parts of Europe, 23.5% were due to *ophthalmia neonatorum*. In the New York Institution for the Blind at Batavia, 23.4% of the inmates are there as the result of the same disease.

Horner has shown that, among 100 blind asylums in different countries, the variation was from 20 to 79%—average, 33%.

Hausmann gives the number in the asylum at Copenhagen, made blind by this disease, 8%; in Berlin, 20%; in Vienna, 30%; in Paris, 45%.

According to the report of the Royal Commission on the Blind of the English Government, published in 1889, 30% of the inmates of the institutions and 7,000 persons in the United

Kingdom have lost their sight from this cause. Professor Magnus, of Breslau, finds that no less than 72% of all who become blind during the first year of life are rendered so by purulent ophthalmia; and even of those who become blind before the twentieth year of life, it constitutes as much as 23-50%. Looking at the subject in another way, he shows that, of 10,000 children under 5 years of age, 4.28% are blind by purulent ophthalmia. In the blind asylums of Switzerland, the proportion who have lost sight from this disease is 26%; in the asylums of Austria, Hungary and Italy, about 20%; while in Spain and Belgium it falls to about 11 or 12%. An investigation into the causes of the blindness of 167 inmates of the Pennsylvania Institute for the Blind, made by Dr. George C. Harlan, of Philadelphia, developed the fact that fifty-five owed their affliction to purulent ophthalmia, and that more than half of these cases occurred in infancy. But nothing is better established than that ophthalmia of the new-born is an infectious and therefore a preventable disease. Whenever it is demonstrated that a disease is infectious, contagious, communicable from person to person, either by direct contact or through the medium of infected articles, it becomes the duty of the physician and the sanitarian to discover, if possible, the source and character of this infectious matter, and to devise means for preventing its transmission.

Ophthalmia of the new-born is an infectious disease, and can only occur after the infectious matter has come into active and somewhat prolonged contact with the conjunctiva. The noxious matter is in every instance derived from an inflamed vagina (or urethra) or from another eye. In the great majority of cases, infection takes place from the vagina; and it is to be remembered that the disease is not caused by the secretion of a specific (gonorrhœal) catarrh only, but that it may be produced by the secretion of simple leucorrhœa, or at least by what is recognized as such clinically.

Formerly this disease was attributed to a variety of causes, such as injuries received by the eyes during birth, icterus,

chilling of the body, too intense light, and so on, but these views are, of course, no longer entertained.

It is hardly too much to say that no one should become blind from this disease; not only because it is quite amenable to treatment, if this be instituted from the beginning, but because the disease itself can be prevented in most instances if those who have the care of mother and child understand the nature of the infection.

From the facts and figures above given, it will be seen that this is simply another way of saying that one-third of those who are now blind might have been saved from this calamity.

Other Fellows who are to address the Academy on closely allied subjects to my own, will be more capable than I to speak at length on the diagnosis and history of this disease, and the means to be adopted for its prevention and speedy cure before vision has suffered permanent impairment. Suffice it to say, that the latter should include attention to the nature of vaginal discharges during the later months of pregnancy; the employment of disinfectant vaginal injections during labor, *if necessary*; careful watching of the eyes of the infant for the first few days of life; and prompt abortive treatment of the first stage of the infection, should it unfortunately occur.

The Cr  d   method, which consists in carefully washing out the eyes with pure warm water, and then instilling two or three drops of a 2% solution of nitrate of silver, is usually sufficient to entirely abort the attack. Perfect recovery with an unimpaired cornea should reward the careful use of this treatment.

Dr. Lucien Howe, of Buffalo, has collected two lists of cases, the first showing the results obtained and published by different obstetricians who used no treatment for the eyes of 8,798 children born under their care. Among these 8.66% had ophthalmia in a greater or less degree.

The second list of 8,574 shows the result of the Cr  d   treatment. In these cases, there were only 0.65%. In the lying-in hospital of Leipzig, where Cr  d   instituted his method, the percentage fell from 7.5 to 0.5%. The advantages of Cr  d  's

method have been recognized by its official recommendation in Austria, Germany, Switzerland and France.

All this presupposes the attendance of a physician. While the State cannot compel every pregnant and parturient woman to have a medical attendant, it can insist that whenever the acting accoucheuse shall notice the slightest indication of inflammation of the eye or the lids, she shall at once notify a legally-qualified practitioner. The sanitary authorities should appoint physicians qualified to treat such cases, and should furnish such attendance free of expense in case of evident poverty. This is certainly as legitimate an expense on the public purse as free vaccination.

In European countries this is made obligatory. The State of New York has had a law in operation for more than three years requiring midwives and nurses to report every case of inflamed or reddened eyes, occurring within two weeks after birth, to some legally-qualified practitioner within six hours after discovery, under penalty of a fine or imprisonment, or both.

Deeply impressed with the importance of this subject, and feeling the responsibility which rests upon it to use the authority conferred upon it for the diminution of this serious disability, the State Board of Health of Pennsylvania has formally adopted the following regulation:

REGULATION V.—FOR THE PREVENTION OF BLINDNESS.

Whenever, in any city, borough, village or place in this State having no health authority of its own, any nurse, midwife or other person, not a legally-qualified practitioner of medicine, shall notice inflammation of the eyes or redness of the lids in a new-born child under his or her care, it shall be the duty of such persons to report the same to some legally-qualified practitioner of medicine within twelve hours of the time the disease is first noticed.

And furthermore, that Board urgently recommends the passage of a similar ordinance by the councils of all cities and bor-

oughs, having health authorities of their own, and the adoption of a similar regulation by such health authorities.

Further, the utmost care should be insisted on in all public educational, correctional and charitable institutions, particularly those occupied by children, to prevent the spread of contagious ophthalmia among the inmates. The common use of wash-basins and towels should be absolutely done away with, and any individuals so affected should occupy a separate dormitory, and not be allowed to mingle with the other children.

The State, however, has only done half its duty when it has relieved society of its burden of one-third of the cases of actual blindness heretofore existent. As already said, perversions and defects of vision as certainly, though not to as great a degree, interfere with the complete efficiency of the individual as absolute destruction of sight. Hence, the sanitary authorities should follow up the growing child from the cradle through adolescence to maturity. Although the eye of the child who has escaped ophthalmia in infancy is almost always good before attendance on school is begun, we find that a larger and larger per cent of pupils have imperfect eyes (as we advance from the kindergarten to the high school) until, it is said, that among educated Germans no less 67% have imperfect or defective eyesight. It is certain that these imperfections in great measure, develop during the years of school life. If this is so, how are these imperfections caused?

1. By using the eyes too constantly at a short distance, as in reading and writing. Indian boys in the woods never become near-sighted, but thousands of our school children do every year. At birth the eyes are adapted to be used at all distances, but by using them exclusively at short distances they soon become of value only for seeing objects close at hand.

2. By using the eyes too constantly and too long at a time. The eye is a very delicate organ; its parts become weary like the rest of the body. If overworked, serious results follow.

The eyes should never be used when they ache, pain or smart, or when vision is weak or blurred.

3. By using them when weak from sickness. After the diseases of childhood, as measles, scarlet fever, whooping-cough, etc., the eyes are often left weak, and may be many months in recovering their full strength. If at such times they are much used in reading or studying, they are very liable to receive permanent injury. To this cause may be laid a large proportion of the defective eyes in our schools.

4. By using the eyes in insufficient light. Very many of our school-rooms are poorly lighted. Children cannot see in them on dark days. Rooms are made still darker by the use of curtains and blinds, which are often partly closed or drawn, and are placed at the top instead of at the bottom of windows. Windows are very often too small. They are often filled with flowers. If children study in the evening, it is too often with a poor light.

5. The print of school-books is too often fine and indistinct.

6. Especially is this the case with regard to maps, which are in the highest degree confusing and distressing to the vision.

7. Polished black-boards are both distressing and trying to the eyes, the writing on them not being visible except from certain points of view.

8. The chalk-dust caused by the use of the black-board and of a dry cloth or eraser is very irritating to the eye.

In what way can the State prevent these deplorable results and preserve the normal vision of its people?

First, by taking pains that school directors shall be persons of intelligence and education, and that positions on school boards shall not be the rewards of political tricksters and ward workers.

Secondly, by issuing instructions to school directors, as to the construction and maintenance of school edifices, especially with regard to the proper introduction of light.

Thirdly, by making positions on school boards open to wo-

men, who, as a rule, are more keenly alive than men to the necessity for guarding the health of children in every respect.

Fourthly, by compelling all applicants for positions as teachers to pass an examination on the hygiene of the school-room, and especially on the hygiene of the eye.

Fifthly, by printing and distributing, not only among these functionaries, but also among parents and the public generally, brief circulars of information and instruction on these subjects.

Sixthly, by obtaining the introduction into public prints and the daily press of articles of the same nature.

Seventhly, by diminishing the hours of study, especially in the primary grades, and diminishing the amount of reading and writing now required during study hours, by encouraging the use of object teaching and illustrated lectures.

Eighthly, by stamping out all eruptive contagious diseases, which are known to have inflammation and ulceration of the eyes, or asthenopia as their sequels.

Enough has, I trust, been said to demonstrate that the State has very definite and positive duties, not only for the prevention of the increase of this large class of defectives, but for the absolute abolition of one of its divisions, and the notable diminution of all.—*Virginia Medical Monthly*.

INTERDEPENDENCE OF OCULAR AFFECTIONS.

BY JAMES A. LYDSTON, M.D., PH.G.

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The tendency of ophthalmological literature to individualize eye diseases is so great that an attempt to trace a closer relationship subsisting between the various ocular affections seems highly justifiable, and may prove interesting to both the oculist and general practitioner. Glancing at any ophthalmological text-book, we find that each disease discussed therein is treated as a separate and distinct affection, possessing such characteristic manifestations that the student is disposed to believe that a diagnosis is so simple that it can be obtained at a glance; and it is only after a succession of failures that he is led to appreciate the folly of such belief. Were we to consider the intimate association of the several ocular tunics from an anatomical stand-point, we would see at once the fallacy of an attempt to separate distinctly and clearly any type of inflammation implicating these structures. It is only in the types of superficial inflammation of the sclera, cornea, and conjunctiva that we can with any reasonable degree of certainty announce to a patient that no other structures are implicated, and even here we might err, were we to aver positively and unequivocally that the conjunctiva, sclera, or cornea were alone involved, basing our conclusions upon the character of the injection present. And yet we find that the nature of an inflammatory process affecting external structures is very frequently founded upon the forms of injection present,—*e.g.*, we find ciliary injection distinguished from conjunctival injection by certain distinctive phenomena, such as color, depth, displacement of

blood-vessels, etc., but these are by no means reliable as a means of differential diagnosis in all cases. In order to emphasize more clearly the intimate association of the types of ocular inflammation, we will direct our attention to the more frequent diseases attacking the extra-ocular tunics, the conjunctiva, cornea and sclera. The varied forms of conjunctivitis are in many instances complicated with irritation of the deeper structures, and to a still greater extent is this true with respect to the cornea, as we often meet with an inflammation of this structure which at first glance appears to be essentially simple, and yet upon more careful investigation of the deeper structures we detect iritic and ciliary complications.

This obtains particularly with respect to keratitis parenchymatosa, in which we often see a deeper anterior chamber, iritic irritation, choroiditis anterior and posterior, increased or diminished intraocular tension, so that we are not in a position in any given case of keratitis parenchymatosa to isolate the phenomena of this affection and ignore other concomitant manifestations, which necessitate a guarded prognosis as to the ultimate outcome of the affection. Again, in case of scleritis, inflammation of the sclera, which is one of the rarest of ocular affections, we are led to conclude finally, if indeed we are not forced to observe at the outset, that the contiguous structures are involved, and the remnants of the disease are always corroborative of such conclusion. Again, one of the most frequent accompaniments of inflammatory changes about the ocular structures is the so-called inflammatory oedema occurring in almost multitudinous affections, such as lid inflammations, erysipelas, hordeola, periostitis, inflammation of the lachrymal sac (dacrocystitis), acute blennorrhœa, purulent keratitis, iridocyclitis, purulent choroiditis, panophthalmitis, etc., and yet we would be far from justified in concluding from its mere presence that its source lay in any one of the structures implicated to the exclusion of neighboring structures (except in case of hordeola, chalazia, etc.), and we are able in case of tumors of different types to pronounce with a remarkable degree of assurance that this or that structure is implicated or

diseased. Again, corneal ulceration and corneal abscess are two distinct varieties of corneal suppuration caused by infection, and yet we find corneal ulcers closely related to corneal abscesses,—*e.g.*, traumatic ulcers which usually are of a benign or malignant type, occurring in elderly people, and when they assume their most malignant form have the yellowish color of pus, with a noticeable, opaque, yellowish, swollen margin, and in these cases we find iritis with hypopyon a frequent concomitant. The essential difference between corneal ulcers and corneal abscesses lies in the fact that ulcers are superficial, while abscesses lie in the depth of the tissues, so that in reality there is but a slight difference between them. With respect to the intraocular structures, let us see what an intimate association exists between affections found in this situation, which are usually described as separate and distinct diseases. Beginning at the vitreous, we find that a pure and simple uncomplicated case of hyalitis, inflammation of the hyaloid body or vitreous humor, is one of the rarest of ocular affections, only occurring in cases in which the vitreous contains a small foreign body which acts as a nucleus of inflammatory reaction; while, *per contra*, we very frequently find the vitreous humor implicated as a result of continuity of an inflammatory process involving contiguous structures; such for example, as choroiditis suppurativa and non-suppurativa. In retinitis, inflammation of the retina, we find in certain cases that the inflammatory process extends to the optic papilla and *vice versa*. The retina, too, by reason of its situation, is prone to become affected by reason of extension of an inflammatory process primarily implicating the choroid. That all-important structure, the lens, is one that is not prone to an isolated inflammation of its structure. A phakitis, so styled, pure and simple, without previous involvement of neighboring structures, is one of the rarest of eye diseases, and yet it is especially liable to pathological changes by means of extension of inflammatory changes from neighboring structures. The iris, by reason of its functions and its situation, is particularly susceptible to inflammatory reaction, and is seldom, if ever, implicated by a cyclitis which, however mild,

is usually present in all iritic inflammations of severe type. This follows as a consequence of the intimate anatomical relationship of the iris and ciliary body. The optic nerves are also susceptible to the influence of inflammation extending from the anterior ocular structures, and *vice versa*, as is illustrated typically by neuritis ascendens and descendens, which Von Graefe first named and assigned to each its characteristic train of symptomatic phenomena; but, unfortunately, we are not always able to define positively the presence of one to the exclusion of the other; in other words, clinically, the one merges into the other, and when we consider that the optic papilla is nothing more than the intraocular termination of the optic nerve proper, we appreciate fully the tendency of upward extension of an inflammatory process which apparently primarily involves the papilla alone; and, *per contra*, with a morbid process involving the nerve-sheaths of their fibrillæ above the papilla, we readily comprehend the cause of its progression downward. Of course, it must be conceded that there are certain types of inflammation of the optic nerve in which it is possible to make a diagnosis ophthalmoscopically. Thus, in the choked disk of engorgement neuritis, when the swelling of the optic papilla is pronounced and abruptly ceases at the edge of the disk, while an intense engorgement of retinal veins co-exists, a diagnosis is not difficult, but there are many transitional forms that render the diagnosis uncertain. Engorgement neuritis by the choked disk, as it is called, is such a frequent concomitant of cerebral tumors, occurring as it does in at least ten per cent. of all cases, that it would hardly be just to pass it without comment. The cerebral diseases which are complicated with optic neuritis are either focal or diffuse. The focal alterations are usually tumor formations, and give by reason of pressure rise to the choked disk, which is often the only indication of a brain tumor, and occasionally exists for a protracted period without exciting any other positive symptoms, which serves to illustrate the importance of ophthalmoscopic examination in all such cases. Rarely, other focal lesions may give rise to optic neuritis, such as thrombosis of the sinuses,

abscesses, apoplexy, aneurisms, cysticerci and echinococcus cysts, etc.; while the diffuse affections are hydrocephalus, acute and chronic meningitis, disseminated sclerosis. Acute meningitis, hydrocephalus, and tubercles of the brain are most frequently the etiological factors in the neuritis of childhood, and these cases do not always fall under the oculist's inspection timely enough to enable him to avert the destructive atrophy which supervenes, notwithstanding his ready ability to recognize the affection.

The foregoing comments would hardly be complete without some reference to suppurative processes implicating the ocular structures generally. In accordance with the conclusions of bacteriological research, suppurative processes are ascribable to schizomycetes, and particularly to the staphylococci, first noted by Ogston and more fully described by Rosenbach. In purulent corneal inflammation fungi have been microscopically defined, either the ordinary pus fungi or fungi of a higher order, such as the *aspergillus glaucus* and *leptothrix buccalis*. A marked purulency follows corneal inoculation with such fungi which eventuates in purulent iritis and panophthalmitis, which has attributed to extension of the fungi to the deeper parts. Accepting, as we must, that the presence of microorganisms is one, if not the chief exciting cause of suppurative inflammation, yet it by no means satisfies the indications in all cases,—*e.g.*, cases in which particles of red-hot metal have been driven into the eye, and then subsequently light up a purulent and destructive inflammation, possibly eventuating in sympathetic inflammation of the opposite eye; and the explanation here given is that the oxidation of the metal causes a chemical reaction sufficient to light up the fatal process; ay, but are the ordinary pus fungi and even the higher fungi not likewise here demonstrable? To be sure. Then we must infer that either these fungi have been introduced from without, or that they have spontaneously developed within, as a result of fermentative changes analogous to the development of the ordinary schizomycetes, or yeast plant, a process which is familiar to all, so that I am of the opinion that

there is in all cases of suppuration a chemical element that is not sufficiently appreciated. This is strongly supported by our antiseptic surgery of to-day. Formerly it was considered requisite in all cases of operations about the abdomen to resort to constant disinfection by the method of Lister; to-day we find our abdominal surgeons applying nothing but sterilized water, with far better results than ever before achieved with all their antiseptic precautions. And what is the rationale of the action of sterilized water under such circumstances? Simply the removal of all organic *debris*, such as blood, disorganized tissue-elements, etc., which would otherwise undergo disintegration, softening and putrefaction, favoring infective suppuration, and at the same time eliminating the irritative effects of the chemical constituents of the various disinfectants.

Relative to the question of transmission of the specific poison of sympathetic ophthalmia, we must ascribe due weight to the conclusions reached by Deutschmann, who found that if certain fungi, staphylococci, or micro-organisms were introduced into the eye, they would travel backward along the optic nerve-sheaths to the base of the brain, and thence crossing to the opposite nerve reach the opposite eye, thus lighting up sympathetic ophthalmitis, or at least an inflammation of the intraocular end of the optic nerve. Regarding the eyeball as simply an expanded bulbous extremity of a nerve with altered characters to meet the functions of its physiological necessity, in order to explain sympathetic ophthalmitis on another basis, it only remains requisite to add the elements of irritation, which in such cases are usually complicated with infection.—*International Medical Magazine.*

OBITUARY.

HERMANN VON HELMHOLTZ +.

Born August 31, 1821. Died September 28, 1894.

By D. W. ZEHENDER (*Klin. Mtsblt f. Aughlk.*).

In undertaking to lay with these lines our wreath *in memoriam* upon the still newly-made grave of von Helmholtz, we cannot hope to say something more recent, or better, or more glorious about him, than has by this time been said or written by others, or will perhaps in future yet be said and written; we only desire to draw the attention of our readers to the post-prandial speech delivered by him at the celebration of his 70th birthday, in which he laid bare his own self before the inner eye of his audience in a much better, truer and more unvarnished manner than another could have done it. This post-prandial speech is a short autobiography, to which perhaps no other one can be compared. Hardly ever has an autobiography been written so objectively, so critical, so devoid of all artificial ornamentation.

The great deceased begins with a description of his youth which was often marred by disease and insists particularly upon the diligence and pleasure with which he early took up the study of physics, and remarks, that, then even, he considered the laws of natural events to be the magic key which would bring power over nature to its possessor. That he always clung to this idea later on, and that under the existing circumstances this led to an impetus of passionate diligence! Whenever a new thought in the realm of science awoke within him, he endeavored to follow up the reasons leading to the

birth of this thought, as far as possible, and to listen to its very beginning. His external life, or the external occurrences during life he hardly mentions.

We ophthalmologists are insolubly, firmly attached to Helmholtz through his invention of the ophthalmoscope, which in the development of ophthalmic science, marks the line between old and modern ophthalmology as sharply and plainly, as it can possibly be thought.

Helmholtz calls the invention of the ophthalmoscope "his most popular scientific achievement" and acknowledges that the construction of this instrument has been of the greatest importance in giving him his position in the eyes of the world. However, von Helmholtz has repeatedly stated, that luck had played a disproportionally much greater part in this than "merit" and that he owed it to the fact that he, according to his father's wish had studied and for a time practiced medicine, the great pleasure, of having been the first to see clearly a living human retina. By his medical work his thought became directed to the wants of practical medicine to a greater degree, than it was usually the case with physicist who principally worked on theories. This was especially the case with his friend Ernst Bruecke, who had studied in the most diligent and painstaking manner the phenomenon of the glowing of the eyes (*Augenleuchten*), without making a step towards utilizing practically what was valuable in his researches. Helmholtz says—and we think he is not quite right in this—that "only a hair's breadth really separated Bruecke from the invention of the ophthalmoscope." He evidently lacked the bold penetration into the future, which Helmholtz possessed. K. von Erlach who had accidentally seen the phenomenon of glowing and rightly interpreted its cause, was, perhaps, just as near to the invention of the ophthalmoscope as Bruecke was. If von Erlach had not looked upon the phenomenon of glowing as a worthless toy, and, if the thought of the possibility of making visible by means of it the interior of the eye had come to him, he would have been much nearer this important discovery. Certainly we can hardly decide, which one of these two men

approached nearer to the invention of the ophthalmoscope, and which one lagged behind.

I may be pardoned for here relating a little incident, which thus far has never been related and has remained unknown.

While in the summer of 1851 Albrecht von Graefe, before entering upon his glorious practical career, stayed at Vienna in order to perfect his medical education, he collected around him a circle of young physicians, to whom he opened the treasure-house of his, even then, rich ophthalmic knowledge. There was in this circle a certain young Dr. Hirsch, who had just finished his medical studies at Königsberg, and like all of us, had come to Vienna for further perfecting himself. At the close of his little private course of lectures on ophthalmology von Graefe said: "One thing alone is still wanting, and this is the possibility to look into the interior of the eye." Dr. Hirsch said: "This invention has just been made by a young professor at Königsberg, by the name of Helmholtz." It seems to me from this, that we may assume that A. von Graefe had come much nearer to inventing the ophthalmoscope than either Bruecke or von Erlach. Nobody will doubt, that von Graefe possessed the necessary knowledge and ability to solve a problem which engaged his mind. Who knows, whether, if Helmholtz had hesitated a little longer with his invention, von Graefe would not have preceded him?

Meanwhile, however, little or nothing depends on who came close or closer to the invention of the ophthalmoscope, and how near he approached to it. The only important question is, who really made the invention. At a festive occasion Donders once said definitely in all our names: "The invention of the ophthalmoscope—the new instrument, which marks the dawn of a new era in ophthalmology—belongs to Helmholtz, and to Helmholtz alone!"

This word will not be forgotten as long as ophthalmic science will live on this earth.

The happy solution of the question of the accommodative act in the human eye by Helmholtz, which question, since Keppler, had agitated the greatest mathematicians, physicists

physiologists, needed an incomparably larger amount of knowledge, of acuteness of mind and of inventive talent.

The ophthalmoscope concerned a question which had never before been mooted; the accommodation, however, was a question which, though raised for more than two hundred years, had thus far remained unsolved. Practically speaking, the invention of the ophthalmoscope has, indeed, been far more fruitful and has therefore become more universally known.

The most valuable heirloom, which Helmholtz leaves to the ophthalmologists is his "Physiological Optics," a work which for all times must remain an example of earnest labor, and for many years a mine for scientific research.